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**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. MI22-1332

First Inventor or Application Identifier Honeycutt

Title Transistor Structures, Methods of...

Express Mail Label No. EI 465687187

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
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Washington, DC 20231

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages 24] 1
(preferred arrangement set forth below)
- Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 9] 1
4. Oath or Declaration [Total Pages 3] 1
- a. ☒ UNEXECUTED Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
- i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☐ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement of Power of Attorney
(when there is an assignee)
9. ☐ English Translation Document (if applicable)
10. ☐ Information Disclosure Statement (IDS)/PTO-1449 [] Copies of IDS Citations
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
13. ☐ * Small Entity Statement(s) [] Statement filed in prior application
(PTO/SB/09-12) Status still proper and desired
14. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
15. ☒ Other: Check # 127747

*** NOTE FOR ITEMS 1 & 13 IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).****16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:**☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____ / _____

Prior application information: Examiner _____

Group / Art Unit: _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.**17. CORRESPONDENCE ADDRESS**☒ Customer Number or Bar Code Label

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38,533

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APPLICATION FOR LETTERS PATENT

* * * * *

Transistor Structures, Methods of Forming Transistor Structures, and Methods of Forming Insulative Material Against Conductive Structures

* * * * *

Jeffrey W. Honeycutt
Hassan Shahjamali
Daniel Smith

ATTORNEY'S DOCKET NO. MI22-1332

1 Transistor Structures, Methods of Forming Transistor Structures, and
2 Methods of Forming Insulative Material Against Conductive Structures

3 **TECHNICAL FIELD**

4 The invention pertains to methods of forming insulative materials
5 against conductive structures, and in particular aspects pertains to
6 methods of forming transistor structures. Also, the invention pertains to
7 transistor structures.

8
9 **BACKGROUND OF THE INVENTION**

10 A frequently used procedure of semiconductor fabrication is
11 formation of a so-called "self-aligned contact" (SAC) opening. An
12 exemplary use of a SAC opening is to expose a node between a pair of
13 wordlines, and can be conducted as follows. First, a pair of adjacent
14 wordlines are formed over a substrate, and then insulative sidewall
15 spacers are formed along conductive portions of the lines. The
16 wordlines typically comprise conductive portions capped by insulative
17 material. Suitable insulative material for capping the wordlines is silicon
18 nitride. A thick insulative layer (typically borophosphosilicate glass
19 (BPSG)) is formed over the wordlines and insulative sidewall spacers.
20 The insulative sidewall spacers are formed of a material different than
21 the thick insulative layer, with a suitable material being silicon nitride.

22 An opening is etched through the thick insulative layer and to an
23 electrical node between the wordlines. If the thick insulative layer

comprises BPSG and the sidewall spacers comprise silicon nitride, the etch utilizes conditions which are selective for the BPSG relative to the silicon nitride. The insulative spacers are exposed during formation of the opening, but are etched more slowly than the BPSG, and preferably are not entirely removed by the etch of the BPSG. The opening is intended to be formed to have a periphery "aligned" with the spacers, and the formation of the opening is referred to as a "self-aligned contact" etch.

It is desired that the spacers not be entirely removed during formation of the opening so that the spacers can protect the conductive material of the wordlines from being exposed when the opening is formed. If the conductive material of the wordlines becomes exposed in the openings, device failure will likely result. A problem with current semiconductor fabrication processes is that silicon nitride insulative spacers are occasionally over-etched during formation of contact openings in BPSG, leading to exposure of wordline conductive material, and to device failure.

A possible method for overcoming the above-discussed problem is described in U.S. Pat. No. 5,700,349, which suggests utilizing $\text{Si}_x\text{O}_y\text{N}_z$ or Al_xO_y based materials to protect conductive portions of a wordline during a SAC method. The utilization of $\text{Si}_x\text{O}_y\text{N}_z$ and Al_xO_y as protective materials relative to the conductive material of a wordline during a SAC method shows promise, in that $\text{Si}_x\text{O}_y\text{N}_z$ and Al_xO_y appear to be more

resistant to SAC etch conditions than is a silicon nitride protective material. However, the materials of U.S. Pat. No. 5,700,349 have problems associated with their use, and it would be desirable to overcome such problems.

SUMMARY OF THE INVENTION

In one aspect, the invention encompasses a method of forming an insulative material along a conductive structure. A conductive structure is provided over a substrate, and an electrically insulative material is formed along at least a portion of the conductive structure. The electrically insulative material comprises at least one of $\text{Si}_x\text{O}_y\text{N}_z$ and Al_pO_q , wherein p, q, x, y and z are greater than 0 and less than 10. A dopant barrier layer is formed over the electrically insulative material. BPSG is formed over the dopant barrier layer, and the dopant barrier layer prevents dopant migration from the BPSG to the electrically insulative material.

In another aspect, the invention encompasses methods of forming transistor structures.

In yet another aspect, the invention encompasses a transistor structure which includes a transistor gate formed over a semiconductive substrate. The transistor gate has a sidewall which comprises electrically conductive material. Source/drain regions are within the substrate and proximate the transistor gate. An electrically insulative material is along

1 the electrically conductive material of the sidewall of the transistor gate.
2 The electrically insulative material comprises at least one of $\text{Si}_x\text{O}_y\text{N}_z$ and
3 Al_pO_q , wherein p, q, x, y and z are greater than 0 and less than 10.
4 A layer consisting of silicon dioxide is over the transistor gate,
5 electrically insulative material and substrate. A layer of BPSG is over
6 the layer consisting of silicon dioxide.

8 BRIEF DESCRIPTION OF THE DRAWINGS

9 Preferred embodiments of the invention are described below with
10 reference to the following accompanying drawings.

11 Fig. 1 is a diagrammatic, cross-sectional, fragmentary view of a
12 portion of a semiconductor wafer at an initial processing step of a
13 method of the present invention.

14 Fig. 2 is a view of the Fig. 1 wafer fragment shown at a
15 processing step subsequent to that of Fig. 1.

16 Fig. 3 is a view of the Fig. 1 wafer fragment shown at a
17 processing step subsequent to that of Fig. 2.

18 Fig. 4 is a view of the Fig. 1 wafer fragment shown at a
19 processing step subsequent to that of Fig. 3.

20 Fig. 5 is a view of the Fig. 1 wafer fragment shown at a
21 processing step subsequent to that of Fig. 4.

1 Fig. 6 is a view of the Fig. 1 wafer fragment shown at a
2 processing step subsequent to that of Fig. 1 in accordance with a second
3 embodiment of the present invention.

4 Fig. 7 is a view of the Fig. 6 wafer fragment shown at a
5 processing step subsequent to that of Fig. 6.

6 Fig. 8 is a view of the Fig. 6 wafer fragment shown at a
7 processing step subsequent to that of Fig. 7.

8 Fig. 9 is a view of the Fig. 6 wafer fragment shown at a
9 processing step subsequent to that of Fig. 8.

10 11 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

12 This disclosure of the invention is submitted in furtherance of the
13 constitutional purposes of the U.S. Patent Laws "to promote the progress
14 of science and useful arts" (Article 1, Section 8).

15 In one aspect, the invention is a recognition that deposited
16 antireflective coating (DARC) materials (which are typically $\text{Si}_x\text{O}_y\text{N}_z$,
17 wherein x, y and z are greater than 0 and less than 10) can be utilized
18 to protect conductive materials of wordlines during an etch of BPSG
19 (such as, for example, during a SAC etch).

20 The invention also encompasses a recognition that if $\text{Si}_x\text{O}_y\text{N}_z$ is
21 utilized to protect a conductive material during an etch, the $\text{Si}_x\text{O}_y\text{N}_z$ is
22 preferably electrically insulative. The $\text{Si}_x\text{O}_y\text{N}_z$ can then function to
23

1 prevent shorting between the protected conductive material and other
2 conductive materials proximate the protected conductive material.

3 Further, the invention encompasses a recognition that $\text{Si}_x\text{O}_y\text{N}_z$ can
4 have different characteristics if dopant is provided therein relative to if
5 the material is undoped. Specifically, if dopant permeates within $\text{Si}_x\text{O}_y\text{N}_z$,
6 the material can develop conductive characteristics which will destroy its
7 ability to function as an electrically insulative protective layer. Dopant
8 can migrate from a doped oxide (such as, for example, BPSG) provided
9 against $\text{Si}_x\text{O}_y\text{N}_z$, and accordingly the invention encompasses provision of
10 a dopant barrier layer between $\text{Si}_x\text{O}_y\text{N}_z$ and a doped oxide provided
11 proximate the $\text{Si}_x\text{O}_y\text{N}_z$.

12 Dopant migration problems may also occur relative to materials
13 comprising Al_pO_q (wherein p and q are greater than 0 and less than 10),
14 and accordingly the invention also comprises provision of a dopant
15 barrier layer between materials comprising Al_pO_q and doped oxide (such
16 as, for example, BPSG).

17 A first embodiment method of the present invention is described
18 with reference to Figs. 1-5. Referring initially to Fig. 1, a
19 semiconductor wafer fragment 10 comprises a semiconductive material
20 substrate 12 having wordlines 14, 16, 18 and 20 formed thereover.
21 Substrate 12 can comprise, for example, monocrystalline silicon lightly
22 doped with a background p-type dopant. To aid in interpretation of the
23 claims that follow, the terms "semiconductive substrate" and

“semiconductor substrate” are defined to mean any construction comprising semiconductive material, including, but not limited to, bulk semiconductive materials such as a semiconductive wafer (either alone or in assemblies comprising other materials thereon), and semiconductive material layers (either alone or in assemblies comprising other materials). The term “substrate” refers to any supporting structure, including, but not limited to, the semiconductive substrates described above.

Wordlines 14, 16, 18 and 20 comprise a gate oxide layer 22, a polysilicon layer 24, a silicide layer 26, a silicon dioxide layer 28, and an insulative cap 30. Gate oxide layer 22 can comprise, for example, silicon dioxide; semiconductive material layer 24 can comprise, for example, conductively-doped polysilicon; silicide layer 26 can comprise, for example, tungsten silicide or titanium silicide; and insulative cap 30 can comprise, for example, silicon nitride.

Shallow trench isolation regions 32 are formed within substrate 12 and electrically isolate at least some of the shown electrical components of wafer fragment 10 from adjacent circuitry (not shown).

Conductively doped diffusion regions 34, 36 and 38 are formed within substrate 12 and between wordlines 14, 16, 18 and 20. Wordlines 14, 16, 18 and 20 extend into and out of the page (i.e., are in the shape of lines extending across a top of substrate 12), and paired diffusion regions are formed within substrate 12 at spaced intervals along the wordlines. The portions of the wordlines which gatedly connect pairs

of diffusion regions constitute transistor gates. Accordingly, the shown portion of wordline 16 constitutes a transistor gate between diffusion regions 34 and 36, and the shown portion of wordline 18 constitutes a transistor gate between diffusion regions 36 and 38.

Diffusion regions 34, 36 and 38 can be doped with one or both of n-type dopant and p-type dopant, and can comprise halo regions and/or lightly doped diffusion (Ldd) regions for transistor structures formed from gates 16 and 18.

Wordlines 14, 16, 18 and 20 comprise sidewalls 15, 17, 19 and 21, respectively, with portions of the sidewalls defined by layers 24 and 26 comprising conductive portions. A silicon dioxide layer 40 is formed along the conductive portions of sidewalls 15, 17, 19 and 21, as well as over diffusion regions 34, 36 and 38. Silicon dioxide layer 40 can be formed by, for example, exposing wafer fragment 10 to oxidizing conditions. Such oxidation can correspond to so-called "smiling gate" oxidation which is known in the art to improve performance of transistor devices. In particular embodiments of the invention which are not shown, layer 40 can be eliminated (e.g., not formed).

Referring to Fig. 2, a pair of layers 42 and 44 are formed over wordlines 14, 16, 18 and 20, as well as over regions of substrate 12 between wordline 14, 16, 18 and 20. Layers 42 and 44 comprise electrically insulative material, and at least one of layers 42 and 44 comprises at least one of $\text{Si}_x\text{O}_y\text{N}_z$ (silicon oxynitride) and Al_pO_q , with p,

1 photolithographic processing (i.e., by providing a patterned layer of
2 photoresist over an upper surface of doped oxide 62, and subsequent
3 etching through oxides 40, 60 and 62), or other techniques. Pillars 45,
4 47, 49 and 51 are utilized to align bottom portions of openings 66, 68
5 and 70 relative to source/drain regions 50, 52 and 54, and accordingly
6 the formation of openings 66, 68 and 70 constitutes a SAC etch. The
7 $\text{Si}_x\text{O}_y\text{N}_z$ and/or Al_pO_q of pillars 45, 47, 49 and 51 reduces etching of the
8 pillars relative to that which would occur if the pillars were formed
9 entirely of Si_3N_4 . However, as discussed above with reference to Fig. 2,
10 one of layers 42 and 44 can consist essentially of silicon nitride. It can
11 be advantageous to have the innermost of the layers (i.e., layer 42)
12 consist of either $\text{Si}_x\text{O}_y\text{N}_z$ or Al_pO_q , and the outermost of the layers (i.e.,
13 layer 44) consist of silicon nitride, so that if there is some over-etching
14 occurring during the anisotropic etching described with reference to Fig.
15 3, it will be silicon nitride layer 44 which is removed, rather than the
16 layer of $\text{Si}_x\text{O}_y\text{N}_z$ or Al_pO_q .

17 Conductive material 72 is formed within openings 66, 68 and 70
18 to form electrical contacts to source/drain regions 50, 52 and 54.
19 Conductive material 72 can comprise conductively-doped polysilicon,
20 and/or metal, and can comprise multiple materials, such as, for example,
21 a silicide at a lower portion where it joins the source/drain region and
22 either metal nitride or metal above the silicide. In the shown
23 embodiment, wafer fragment 10 comprises a planarized upper surface 74

1 which can be formed by, for example, chemical-mechanical planarization
2 after filling openings 66, 68 and 70 with conductive material 72.

3 Another embodiment of the invention is described with reference
4 to Figs. 6-9. In referring to Figs. 6-9, similar numbering will be utilized
5 as was used above in describing Figs. 1-5, where appropriate.

6 Referring first to Fig. 6, a wafer fragment 100 comprises a
7 substrate 12 having wordlines 14, 16, 18 and 20 formed thereover. An
8 insulative material 102 is provided over wordlines 14, 16, 18 and 20, as
9 well as over regions of substrate 12 between wordlines 14, 16, 18
10 and 20. Material 102 consists of, or consists essentially of, $\text{Si}_x\text{O}_y\text{N}_z$ or
11 Al_pO_q , with p, q, x, y and z being greater than 0 and less than 10, and
12 can be provided to a thickness of, for example, from about 10Å to
13 about 750Å, with a suitable thickness being greater than about 50Å, and
14 being, for example, about 25% of the gate length for the particular
15 structure. In embodiments in which layer 40 is not formed (not shown),
16 material 102 will contact conductive material of gates 14, 16, 18 and 20.

17 Referring to Fig. 7, material 102 is anisotropically etched to form
18 insulative pillars 104, 106, 108 and 110 adjacent wordlines 14, 16, 18
19 and 20, respectively. Subsequently, source/drain regions 50, 52 and 54
20 are implanted into substrate 12.

21 Referring to Fig. 8, a dopant barrier layer 60 and doped oxide
22 layer 62 are provided over wordlines 14, 16, 18 and 20 as well as over
23 pillars 104, 106, 108 and 110.

1 CLAIMS:

2 1. A method of forming an insulative material along a
3 conductive structure, comprising:

4 providing a conductive structure over a substrate;

5 forming an electrically insulative material along at least a portion
6 of the conductive structure, the electrically insulative material comprising
7 at least one of $\text{Si}_x\text{O}_y\text{N}_z$ and Al_pO_q , wherein p, q, x, y and z are greater
8 than 0 and less than 10;

9 forming a dopant barrier layer over the electrically insulative
10 material; and

11 forming a doped oxide material over the dopant barrier layer, the
12 dopant barrier layer preventing dopant migration from the doped oxide
13 material to the electrically insulative material.

14
15 2. The method of claim 1 wherein the electrically insulative
16 material is formed to a thickness of at least about 50Å.

17
18 3. The method of claim 1 wherein the electrically insulative
19 material consists essentially of the $\text{Si}_x\text{O}_y\text{N}_z$.

1 4. The method of claim 1 wherein the electrically insulative
2 material consists essentially of the $\text{Si}_x\text{O}_y\text{N}_z$ and is against the conductive
3 structure.

4
5 5. The method of claim 1 wherein the electrically insulative
6 material consists essentially of the Al_pO_q .

7
8 6. The method of claim 1 wherein the electrically insulative
9 material consists essentially of the Al_pO_q and is against the conductive
10 structure.

11
12 7. The method of claim 1 wherein the forming the dopant
13 barrier layer comprises chemical vapor depositing silicon oxide from a
14 TEOS precursor.

15
16 8. The method of claim 1 wherein the doped oxide material
17 comprises BPSG.

11. The method of claim 9 wherein the first of the at least two layers is between the second of the at least two layers and the transistor gate sidewall.

12. The method of claim 9 wherein the first of the at least two layers consists essentially of the $\text{Si}_x\text{O}_y\text{N}_z$ and is between the second of the at least two layers and the transistor gate sidewall.

13. The method of claim 9 wherein the first of the at least two layers consists essentially of the Al_pO_q and is between the second of the at least two layers and the transistor gate sidewall.

18. The method of claim 14 wherein the electrically insulative material consists of silicon, nitrogen and oxygen.

19. A method of forming a transistor structure, comprising:
forming a transistor gate over a substrate, the transistor gate comprising a sidewall which comprises electrically conductive material;
forming an electrically insulative material along the electrically conductive material of the transistor gate sidewall, the electrically insulative material comprising at least one of $\text{Si}_x\text{O}_y\text{N}_z$ and Al_pO_q , wherein p, q, x, y and z are greater than 0 and less than 10;

anisotropically etching the electrically insulative material to form a spacer along the transistor gate sidewall;

implanting a dopant into the substrate and utilizing the spacer to align the dopant during the implant;

chemical vapor depositing silicon oxide over the transistor gate and spacer utilizing TEOS as a precursor of the silicon oxide; and

forming BPSG over the silicon oxide, the BPSG being spaced from the electrically insulative material of the spacer by the silicon oxide.

1 20. The method of claim 19 wherein the electrically insulative
2 material comprises two different layers that are against one another, one
3 of the layers consisting of silicon nitride, and the other of the two layers
4 consisting of either the $\text{Si}_x\text{O}_y\text{N}_z$ or the Al_pO_q .

6 21. A transistor structure, comprising:

7 a semiconductive substrate;

8 a transistor gate over the substrate, the transistor gate having a
9 sidewall which comprises electrically conductive material;

10 source/drain regions within the substrate and proximate the
11 transistor gate;

12 an electrically insulative material along the electrically conductive
13 material of the sidewall, the electrically insulative material comprising at
14 least one of $\text{Si}_x\text{O}_y\text{N}_z$ and Al_pO_q , wherein p, q, x, y and z are greater
15 than 0 and less than 10;

16 a layer consisting of silicon dioxide over the transistor gate,
17 electrically insulative material, and substrate; and

18 a layer of BPSG over the layer consisting of silicon dioxide.

19
20 22. The structure of claim 21 wherein the electrically insulative
21 material extends across a top of the transistor gate.
22
23

1 23. The structure of claim 21 wherein the electrically insulative
2 material does not extend across a top of the transistor gate.

3
4 24. The structure of claim 21 wherein the electrically insulative
5 material does not extend across a top of the source/drain regions.

6
7 25. The structure of claim 21 wherein the electrically insulative
8 material consists of aluminum and oxygen.

9
10 26. The structure of claim 21 wherein the electrically insulative
11 material consists of Al_2O_3 .

12
13 27. The structure of claim 21 wherein the electrically insulative
14 material consists of silicon, nitrogen and oxygen.

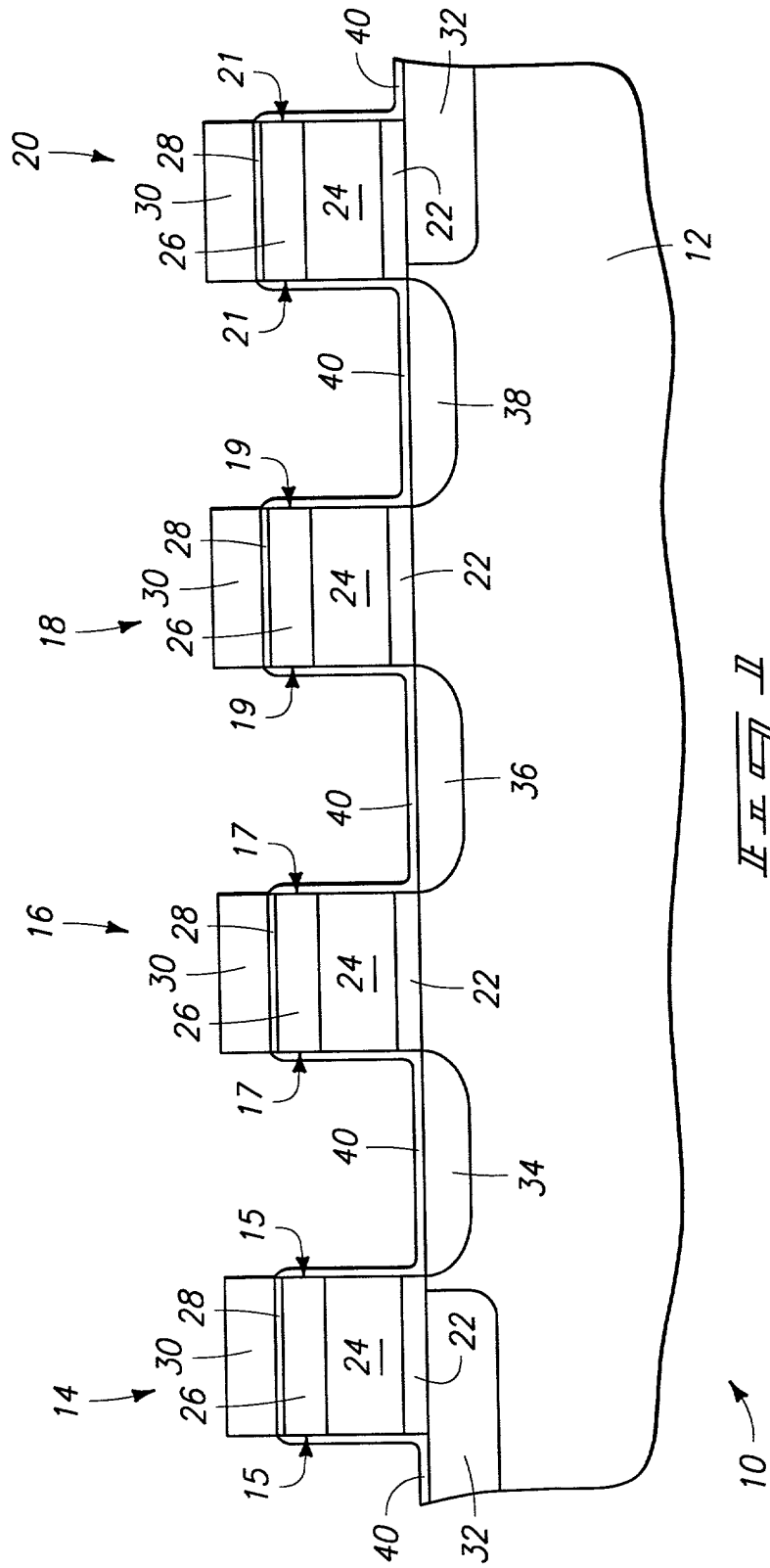
15
16 28. The structure of claim 21 wherein the electrically insulative
17 material comprises a layer of silicon nitride against a layer of the
18 $\text{Si}_x\text{O}_y\text{N}_z$.

19
20 29. The structure of claim 21 wherein the electrically insulative
21 material comprises a layer of silicon nitride against a layer of the Al_pO_q .

1 **ABSTRACT OF THE DISCLOSURE**

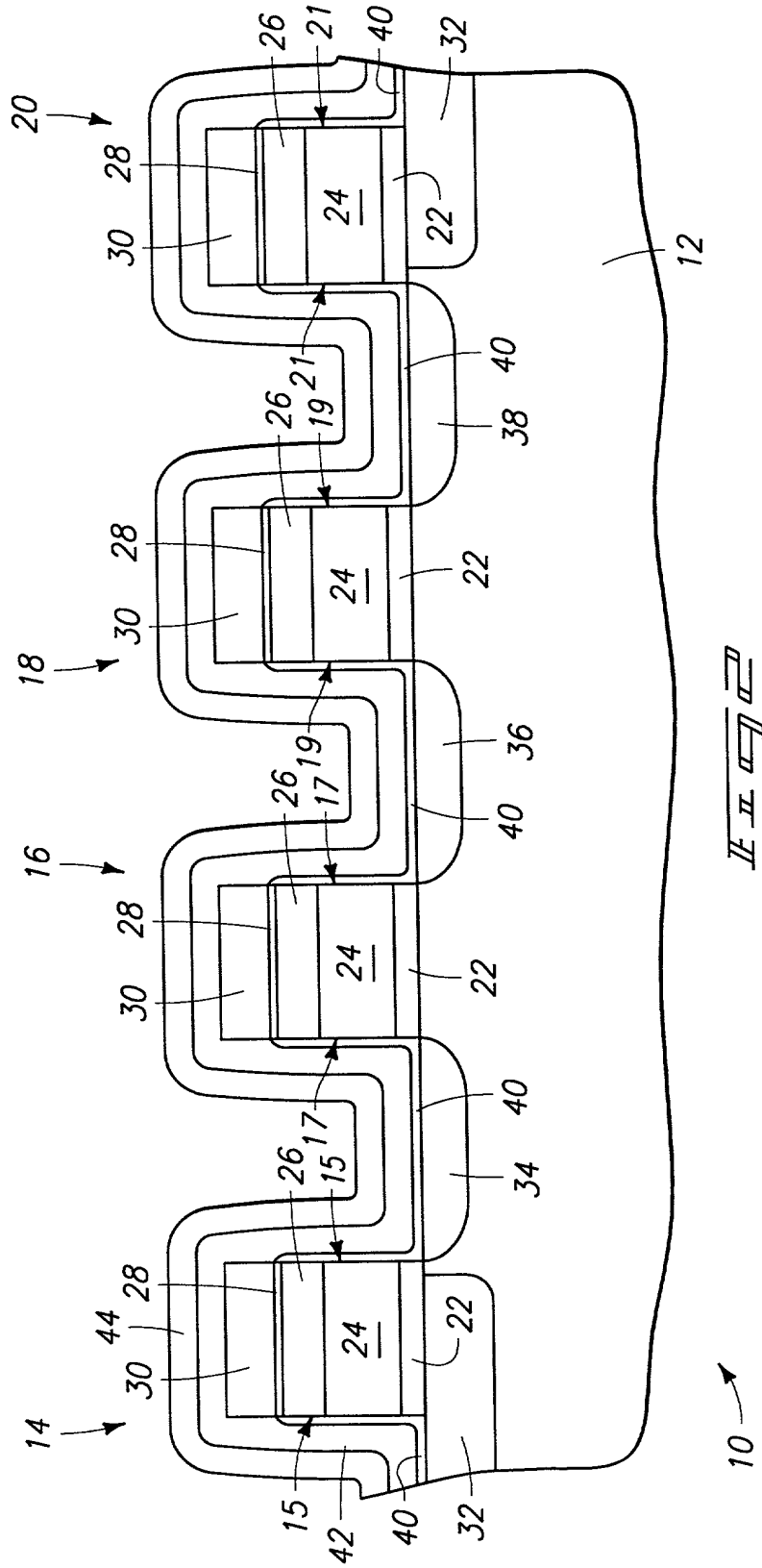
2 The invention encompasses a method of forming an insulative
3 material along a conductive structure. A conductive structure is
4 provided over a substrate, and an electrically insulative material is
5 formed along at least a portion of the conductive structure. The
6 electrically insulative material comprises at least one of $\text{Si}_x\text{O}_y\text{N}_z$ and
7 Al_pO_q , wherein p, q, x, y and z are greater than 0 and less than 10.
8 A dopant barrier layer is formed over the electrically insulative material.
9 BPSG is formed over the dopant barrier layer, and the dopant barrier
10 layer prevents dopant migration from the BPSG to the electrically
11 insulative material. The invention also encompasses transistor structures,
12 and methods of forming transistor structures.

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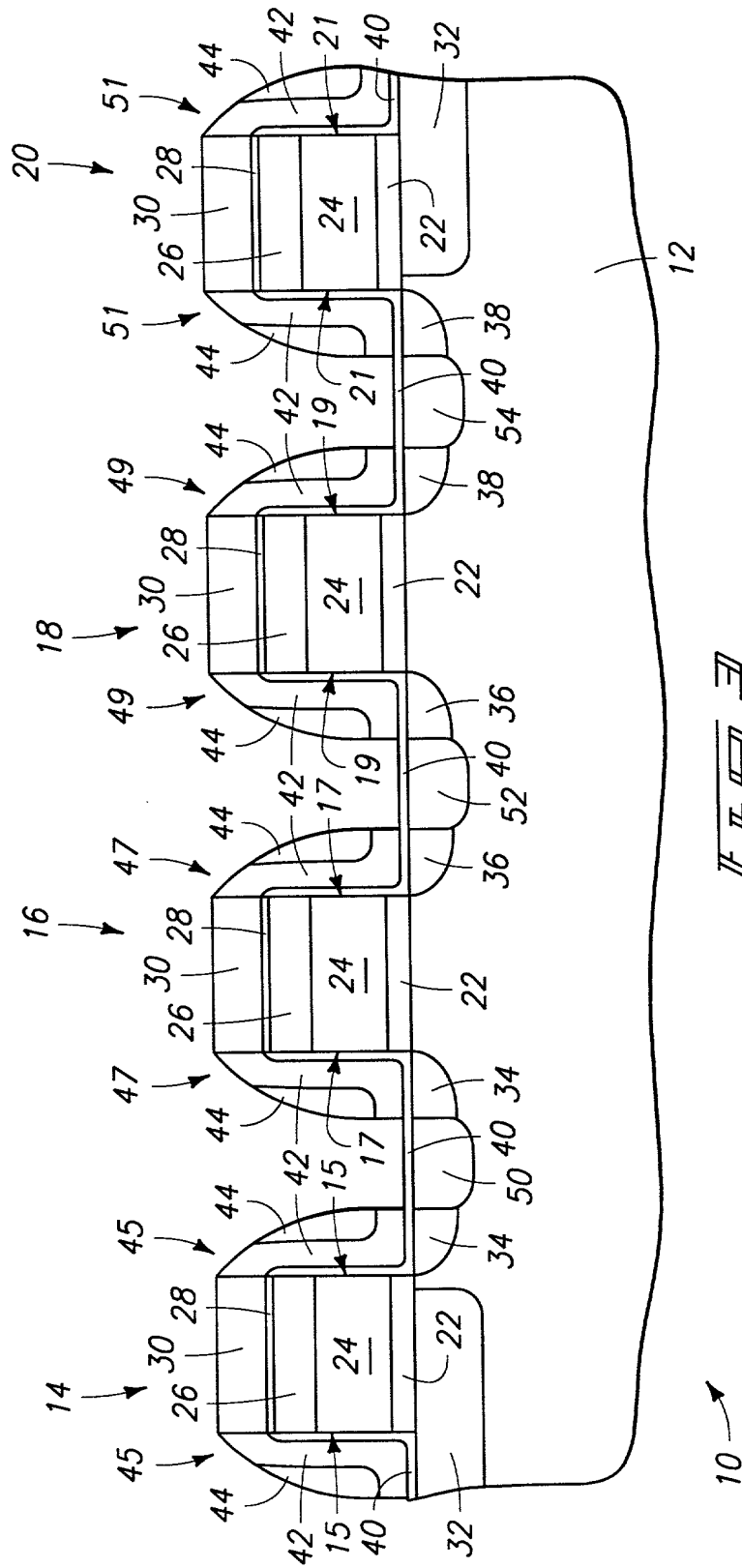


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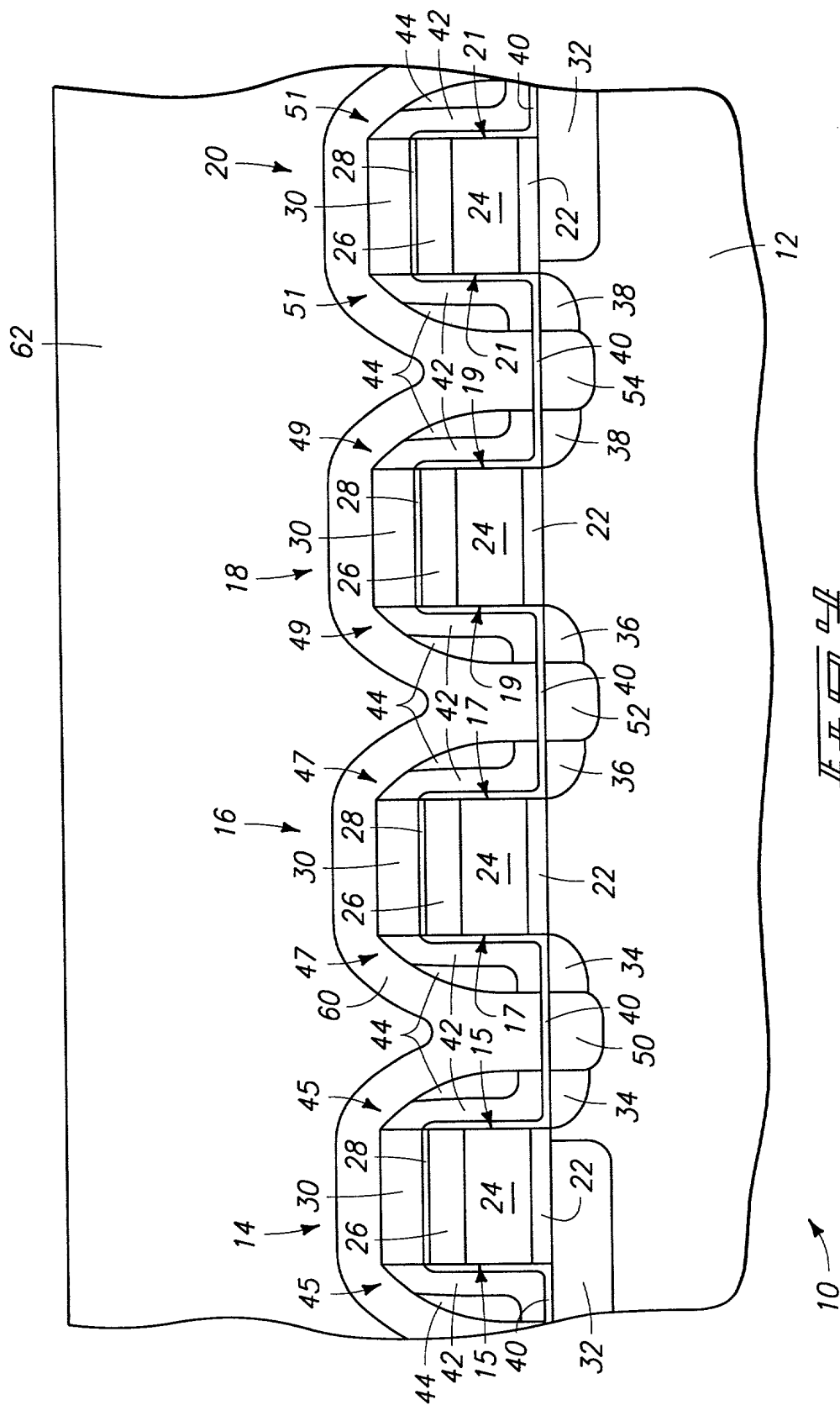
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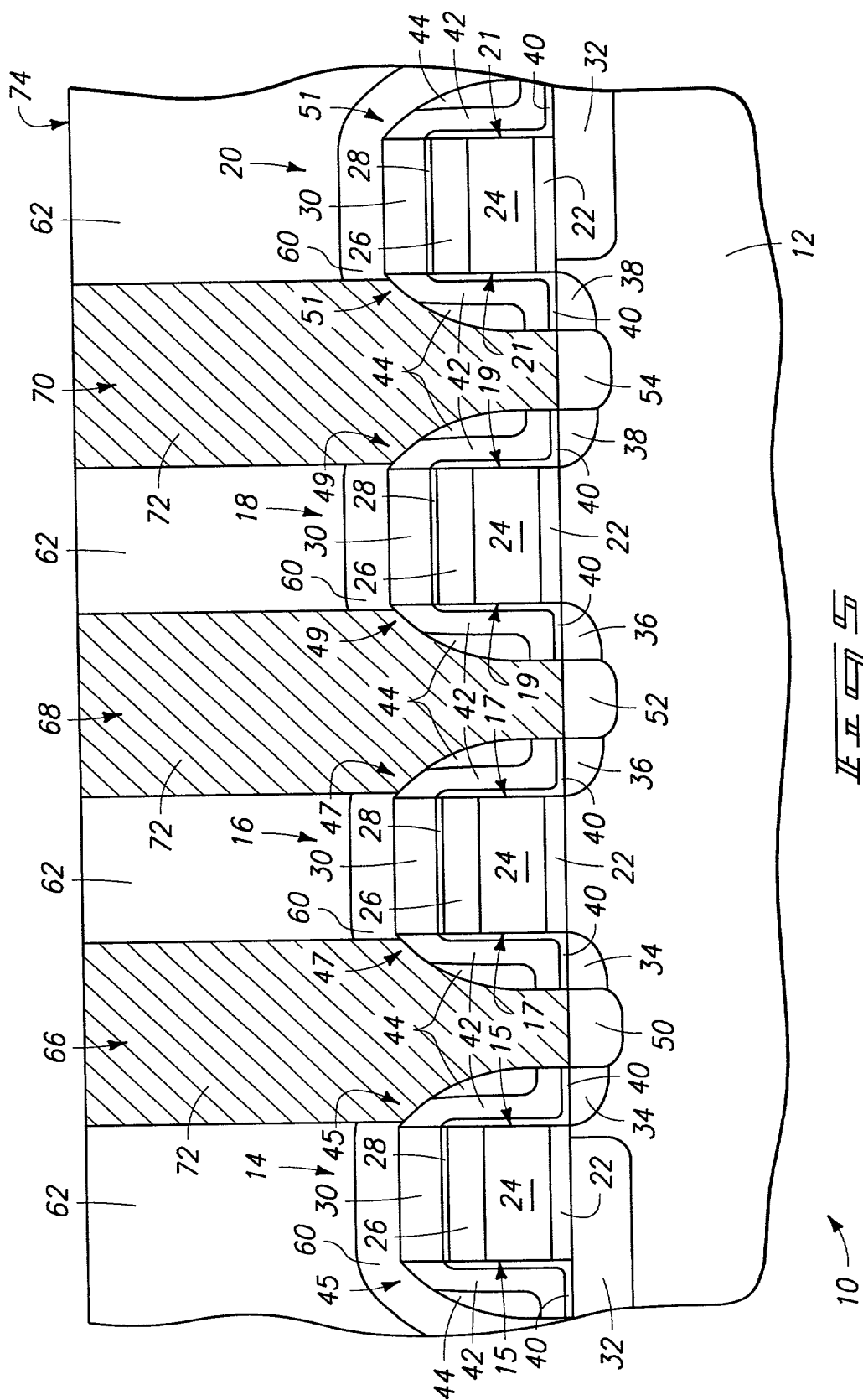


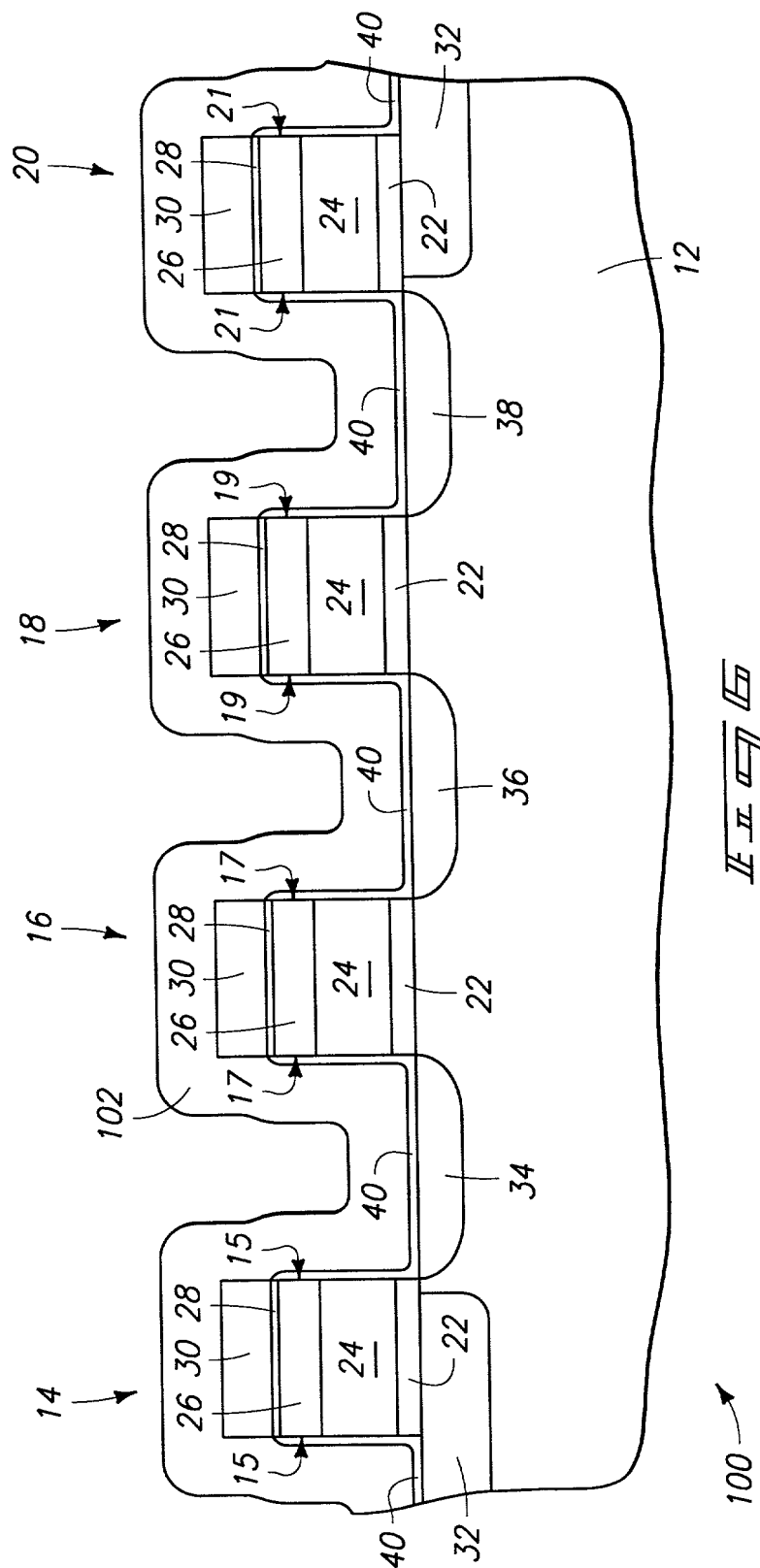
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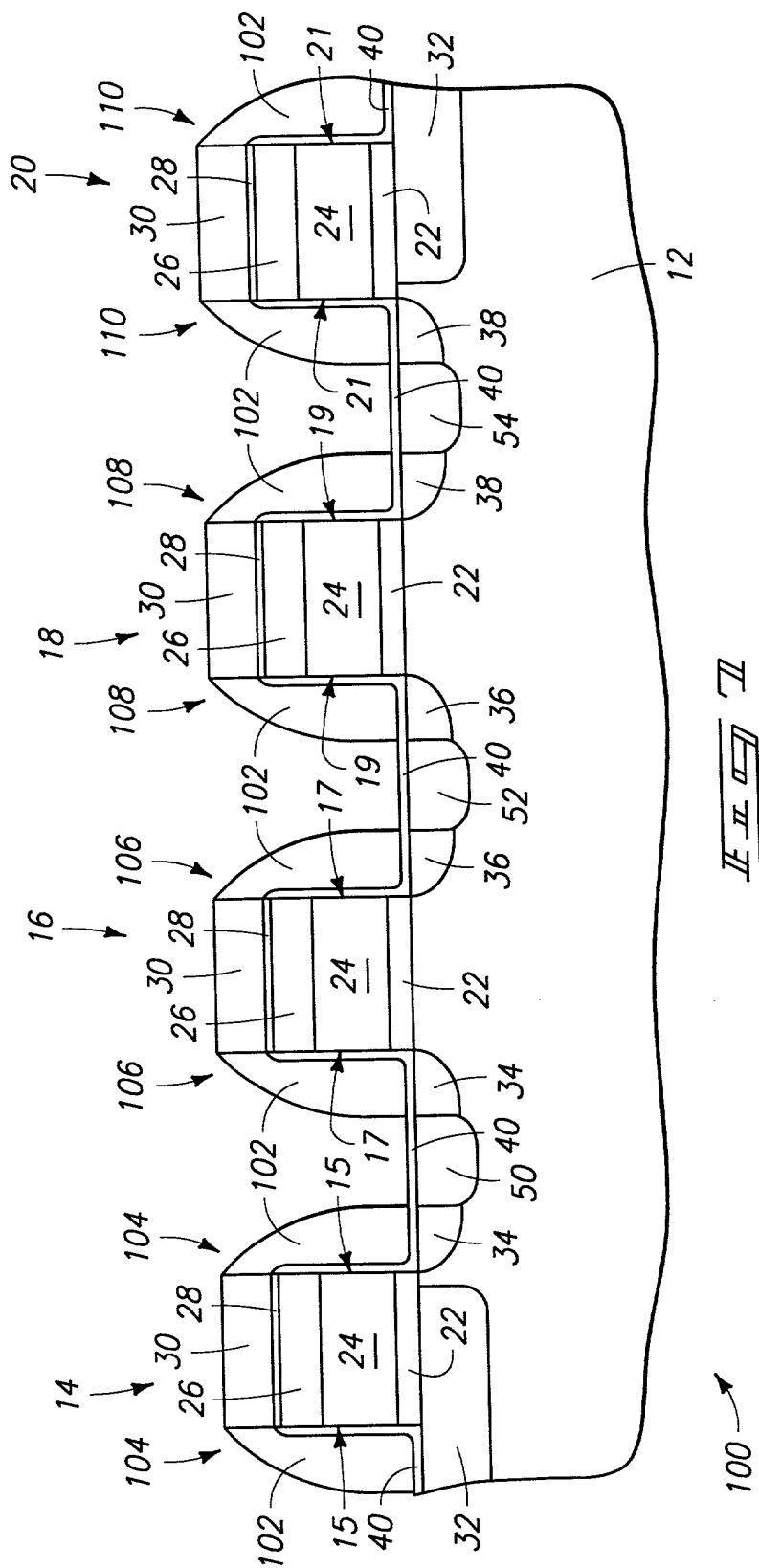
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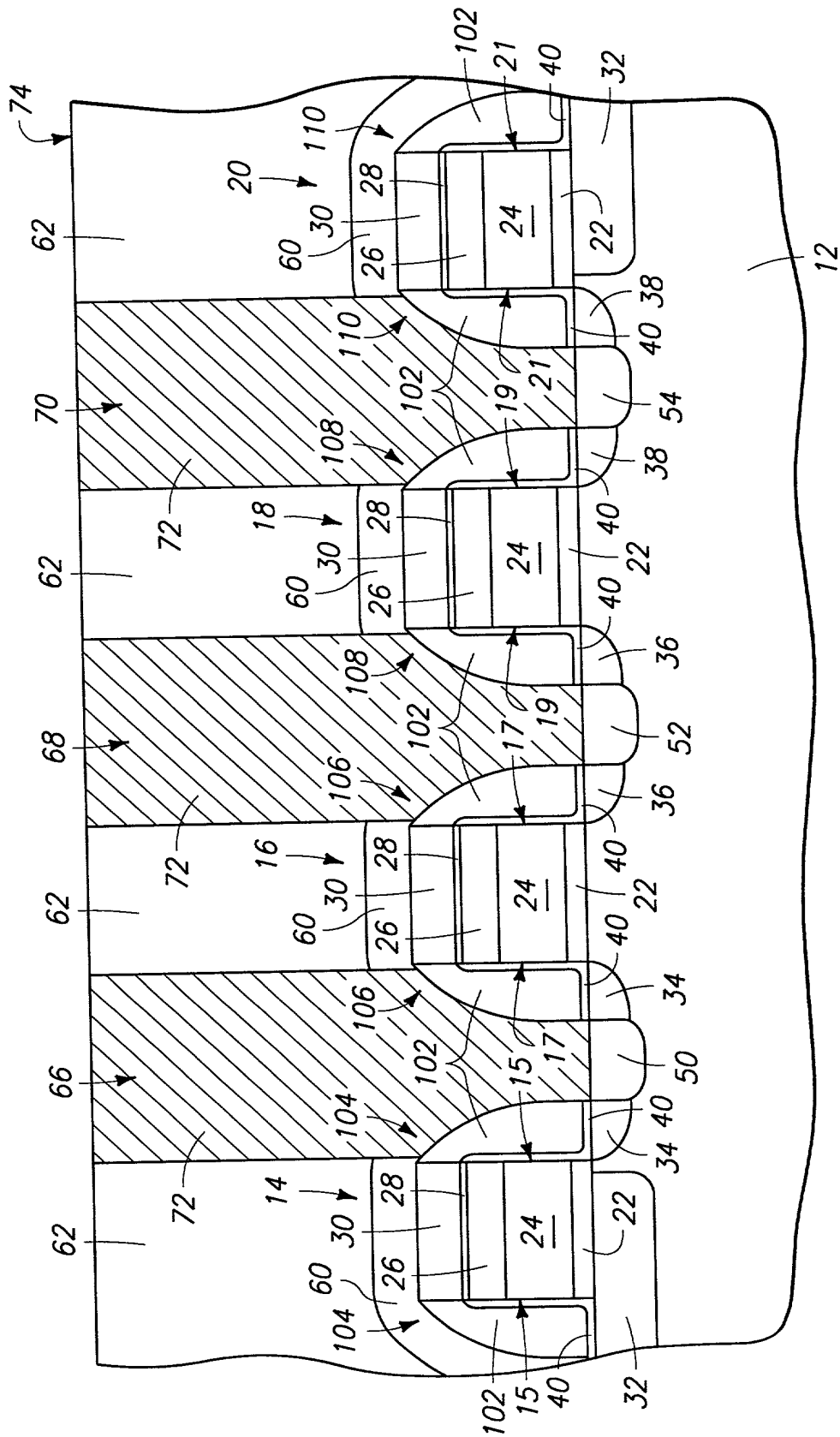
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100

DECLARATION OF JOINT INVENTORS FOR PATENT APPLICATION

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled: Transistor Structures, Methods of Forming Transistor Structures, and Methods of Forming Insulative Material Against Conductive Structures, the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations §1.56.

PRIOR FOREIGN APPLICATIONS:

I hereby state that no applications for foreign patents or inventor's certificates have been filed prior to the date of execution of this declaration.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so

1 made are punishable by fine or imprisonment, or both, under
2 Section 1001 of Title 18 of the United States Code and that such willful
3 false statement may jeopardize the validity of the application or any
4 patent issued therefrom.

5 * * * * *

6 Full name of inventor: **Jeffrey W. Honeycutt**

7 Inventor's Signature: _____

8 Date: _____

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12 * * * * *

13
14 Full name of inventor: **Hassan Shahjamali**

15 Inventor's Signature: _____

16 Date: _____

17 Residence: **Boise, ID**

18 Citizenship: **US**

19 Post Office Address: **9701 Hackamore Drive**
Boise, ID 83709

20

21

22

Variable	Mean	SD	Min	Max
Age	34.5	10.2	21	55
Gender	0.5	0.5	0	1
Marital status	0.6	0.5	0	1
Education	12.5	1.5	9	16
Income	1500	500	500	3000
Health status	0.8	0.2	0	1
Smoking status	0.3	0.5	0	1
Alcohol consumption	0.2	0.4	0	1
Exercise frequency	0.5	0.5	0	1
Stress level	0.7	0.3	0	1
Depression score	0.4	0.4	0	1
Life satisfaction	0.6	0.3	0	1
Work satisfaction	0.5	0.4	0	1
Family satisfaction	0.6	0.3	0	1
Community satisfaction	0.5	0.4	0	1
Overall well-being	0.6	0.3	0	1

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Full name of inventor: **Daniel Smith**

Inventor's Signature: _____

Date: _____

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Citizenship: US

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